

## **WATER BOARD 2017 SPRING TREATMENT SUMMARY FOR MARCH 13 – MARCH 19, 2017**

Prepared by Water Board personnel, March 20, 2017.

During the time period of March 13, to March 19, 2017, the Water Board's contractor, TKT Consulting LLC (TKT), continued to perform 2017 Spring Treatment activities at Leviathan Mine. TKT continued siphoning AMD from Pond 2 South to Pond 3 and neutralizing the AMD with the Rotating Cylinder Treatment System (RCTS) March 13<sup>th</sup> through 19<sup>th</sup>. TKT discharged neutralized AMD to Leviathan Creek on March 13<sup>th</sup>, 16<sup>th</sup>, and 18<sup>th</sup>. 2017 Spring Treatment discharge volumes can be seen in Table 1.

U.S. Forest Service (USFS) Road 31052 from U.S. Highway 395 to Leviathan Mine remained a mix of mud, packed snow, and ice from March 13 - 19, 2017. Later in the week, as temperatures warmed, the road became muddier in some areas and began to dry out in other areas. At all times the road remained passable with a four-wheel-drive vehicle. No damage to the roadbed occurred due to travel on the road during this time period. Water Board personnel have been in contact with USFS personnel to keep them apprised of road conditions.

Conditions onsite during this time period remained extremely challenging. Morning temperatures were well below freezing and often warmed significantly during the day. Areas where snow removal occurred became muddy as temperatures warmed making work and travel difficult. In some areas the mud began to dry out. Unplowed areas of the site remained covered by 1-4 feet of snow and continue to necessitate a large amount of labor carrying equipment by hand. Pond 3 remained mostly ice covered which continued to make the treatment process challenging due to inefficient mixing. TKT continued to use multiple pumps through holes in the ice in an attempt to expedite the mixing process. See photos 1-4.

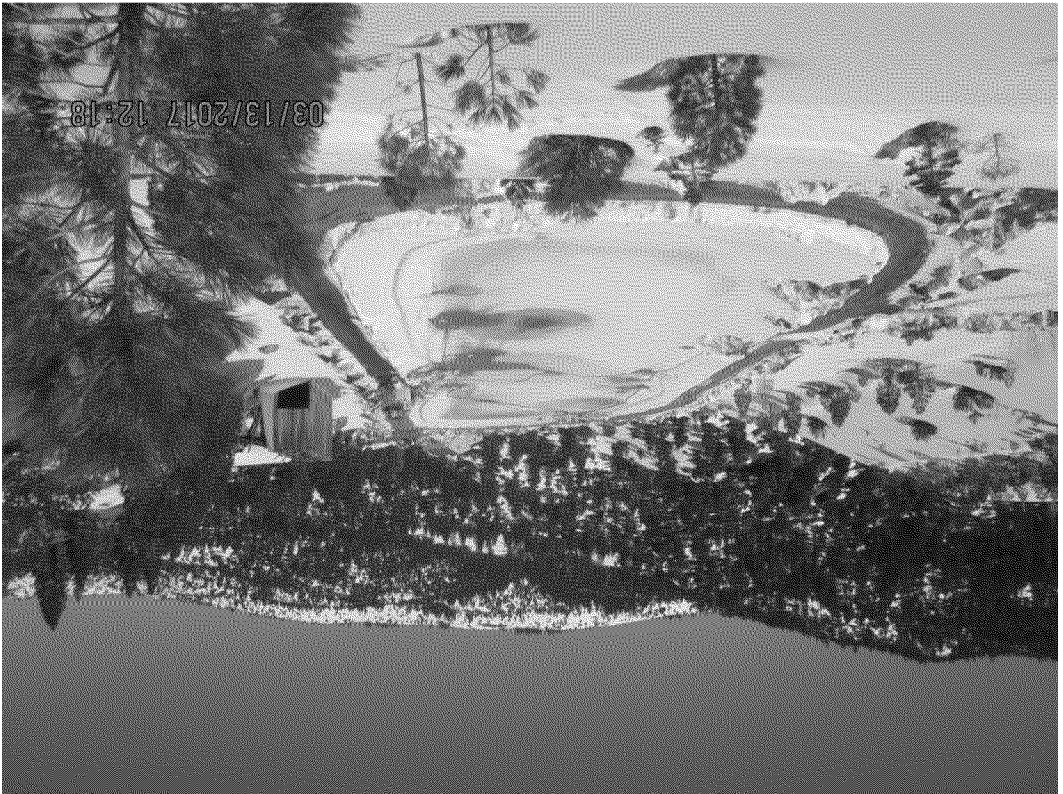


Photo 1 – TKT neutralizing AMD in Pond 3 with the RCTS

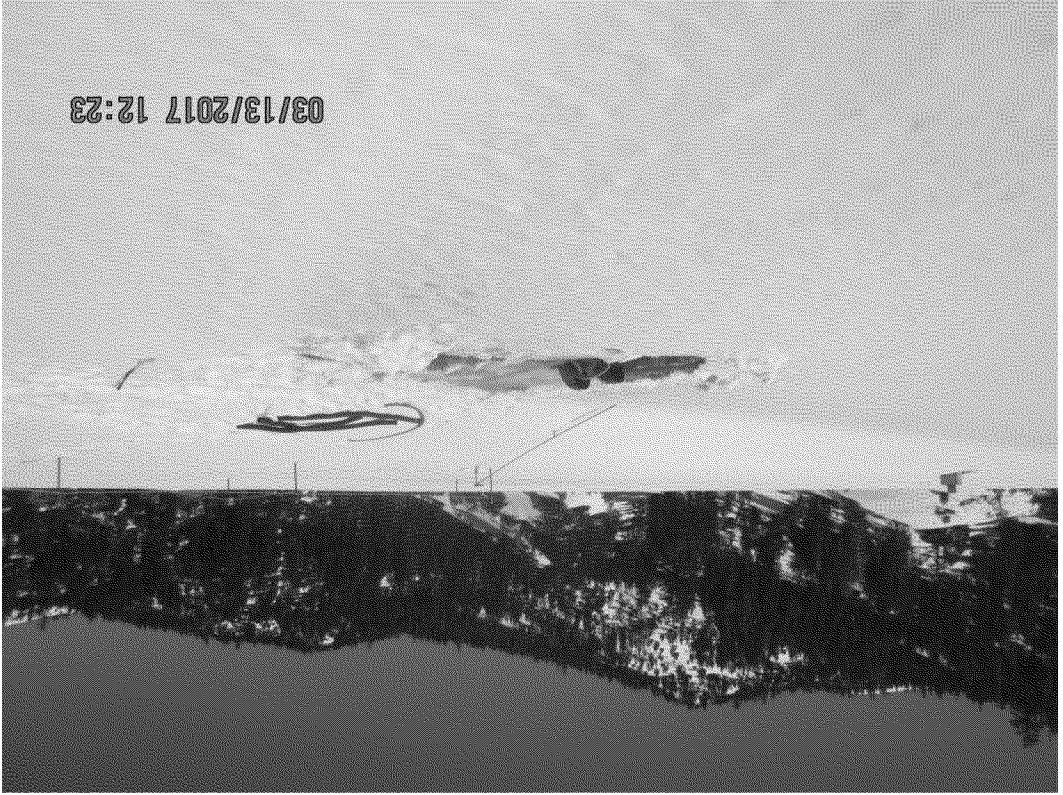


Photo 2 – Siphon from Pond 2 South overflow to Pond 3 and RCTS



Photo 3 – Pond 1 in the foreground and Ponds 2 North and 2 South in the background



Photo 4 – TKT neutralizing AMD in Pond 3 with the RCTS

Sample results from the March 10, and 13, 2017 discharge events and March 7, 10, and 14, 2017 untreated pond water samples became available and have been added to Tables 2 and 3. TKT collected two untreated pond water samples and two discharge samples; analytical results for these samples are still pending and will be added to Tables 2 and 3 when they become available.

The stage of water contained in Pond 1, as of March 20, 2017, can be seen on Figure 1. The combined flow of AMD from the Adit and Pit Underdrain (PUD) as of March 20, 2017 is 70.5 gallons per minute which is an increase of approximately 25 gallons per minute from the combined flow observed one week ago.

The Water Board's contractor, TKT, intends to continue AMD neutralization in Pond 3 throughout the upcoming week. Rain and snow are forecasted for much of the upcoming week. Water Board personnel will continue to visit the site throughout the upcoming week and prepare the next 2017 Spring Treatment summary on March 27, 2017.

Table 1  
2017 Spring Treatment, Leviathan Mine  
Pond 3 Estimated Discharge Volume

Date	Estimated Discharge Volume (gallons)
3/4/2017	380,000
3/10/2017	430,000
3/13/2017	326,000
3/16/2017	420,000
3/18/2017	467,000

Total Spring Treatment Discharge Volume 2,033,000

Table 2  
2017 Spring Treatment, Leviathan Mine  
Untreated Pond Water Sample Results

SAMPLE ID	Sample Description	SAMPLE DATE	pH	TEMP (°C)	Aluminum			Arsenic			Cadmium			Calcium			Chromium			Cobalt			Copper			Iron			Lead			Magnesium			Manganese			Nickel			Selenium			Sulfate (as SO <sub>4</sub> )			Total Dissolved Solids			Zinc					
USEPA Daily Maximum Discharge Criteria					6.0 - 9.0			4			0.34			0.009			NP			0.97			NP			0.026			2			0.136			NP			NP			0.84			NP			NP			0.21					
USEPA 4-Day Average Discharge Criteria					NP			2			0.15			0.004			NP			0.31			NP			0.016			1			0.005			NP			NP			0.094			0.005			NP			NP			0.21		
								Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ						
001P3001	Untreated water in Pond 3	2/24/2017	7.2	1.74	7.2	L		ND, 0.001			0.004			95.3			0.005			0.145	L		0.086			0.30			ND, 0.001			21.1			0.869			0.332			0.002			362	D		513			0.10					
001P1002	Untreated water in Pond 1	2/24/2017	7.08	0.09	7.08	D		0.188			0.004			80.4			0.075			0.22	D		0.127			20.3			ND, 0.001			7.6			1.24			0.577			0.001			587	D		789			0.13					
003P25004	Untreated water in Pond 2 South	3/7/2017	7.2	0.30	7.2	D		0.894			0.009			53.2			0.236			0.550			0.343			1.3			ND, 0.001			12.5			2.99			1.4			0.002			1140	D		1680			0.2					
004P25006	Untreated water in Pond 2 South	3/10/2017	7.64	0.0	7.64			0.403			0.007			39.8			0.170			0.425			0.254			68.7			ND, 0.001			10.3			2.20			1.17			0.003			858	D		1240			0.2					
006P25008	Untreated water in Pond 2 South	3/14/2017	7.64	0.0	7.64	D		0.256			0.007			38.8			0.180			0.417			0.277			7.4			ND, 0.001			9.9			2.18			1.39			0.002			718	D		1110			0.20					
008P25010*	Untreated water in Pond 2 South	3/17/2017	7.5	0.0																																																			
010P25012*	Untreated water in Pond 2 South	3/19/2017	7.5	0.0																																																			

Table 3  
2017 Spring Treatment, Leviathan Mine  
Pond 3 Discharge Sample Results

SAMPLE ID	Sample Description	SAMPLE DATE	pH	TEMP (°C)	Aluminum			Arsenic			Cadmium			Calcium			Chromium			Cobalt			Copper			Iron			Lead			Magnesium			Manganese			Nickel			Selenium			Sulfate (as SO <sub>4</sub> )			Total Dissolved Solids			Zinc		
USEPA Daily Maximum Discharge Criteria			6.0 - 9.0		4			0.34			0.009			NP			0.97			NP			0.026			2			0.136			NP			NP			0.84			NP			NP			NP			0.21		
USEPA 4-Day Average Discharge Criteria			NP		2			0.15			0.004			NP			0.31			NP			0.016			1			0.005			NP			NP			0.094			0.005			NP			NP			0.21		
					Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ			
002D5003	Pond 3, Treated discharge	3/4/2017	7.64	0.0	3.16			ND, 0.001			0.002			84.3			ND, 0.005			0.068			0.047			0.11			0.002			19.5			0.471			0.163			0.003			262			361			0.05		
004D5005	Pond 3, Treated discharge	3/10/2017	8.30	0.0	0.19			0.002			ND, 0.001			362			ND, 0.005			0.015			ND, 0.005			0.12			ND, 0.001			20.2			0.263			0.051			0.008			1040	D		1500			ND, 0.01		
005D5007	Pond 3, Treated discharge	3/13/2017	7.83	0.0	0.24			0.002			ND, 0.001			231			ND, 0.005			0.029			0.008			0.04			ND, 0.001			8.4			0.251			0.083			0.004			617	D		866			0.01		
007D5009*	Pond 3, Treated discharge	3/16/2017	7.67	0.0																																																
009D5011*	Pond 3, Treated discharge	3/18/2017	8.55	0.0																																																

All values reported in milligrams per liter (mg/L) except pH which are in Standard Units and temperature which are in the units specified above.  
All parameters are dissolved except Selenium which is total recoverable.  
All results are preliminary  
NP - Not Promulgated  
NA - Not Analyzed  
\* - Analytical results pending  
Sample 0008 exceeds USEPA Daily Maximum Discharge Criteria.  
  
Data Qualifiers (DQ) from the Laboratory:  
D - Analyte reporting limit increased due to sample matrix  
L - Lowest available reporting limit for the analytical method used  
ND - Not detected at the reporting limit, number following ND represents the reporting limit

**Figure 1 - Leviathan Mine Pond 1 Stage**

